

## ABSTRACT OF THE DISCLOSURE

A replaceable, electronically-isolated, MCP-based spectrometer detector cartridge with enhanced sensitivity is disclosed. A coating on the MCP that enhances the secondary electron emissivity characteristics of the MCP is selected from aluminum oxide ( $\text{Al}_2\text{O}_3$ ), magnesium oxide ( $\text{MgO}$ ), tin oxide ( $\text{SnO}_2$ ), quartz ( $\text{SiO}_2$ ), barium fluoride ( $\text{BaF}_2$ ), rubidium tin ( $\text{Rb}_3\text{Sn}$ ), beryllium oxide ( $\text{BeO}$ ), diamond and combinations thereof. A mass detector is electro-optically isolated the from a charge collector with a method of detecting a particle including accelerating the particle with a voltage, converting the particle into a multiplicity of electrons and converting the multiplicity of electrons into a multiplicity of photons. The photons then are converted back into electrons which are summed into a charge pulse. A detector also is provided.

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